

ACCESSION #: 9605140381

LICENSEE EVENT REPORT (LER)

FACILITY NAME: CRYSTAL RIVER UNIT 3 (CR-3) PAGE: 1 OF 4

DOCKET NUMBER: 05000302

TITLE: Switchyard Cable Failure Caused Degraded Voltage of Class

1E Electrical Busses and Actuation of Emergency Diesel

Generators

EVENT DATE: 03/29/93 LER #: 93-002-03 REPORT DATE: 05/10/96

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: 5 POWER LEVEL: 000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: J. A. Frijouf, Sr. Nuclear TELEPHONE: (352) 563-4754

Regulatory Specialist

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: FK COMPONENT: CB MANUFACTURER: U000

REPORTABLE NPRDS: NO

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On March 29, 1993, Florida Power Corporation's (FPC) Crystal River Unit 3 was in MODE 5, COLD SHUTDOWN. All electrical power was being supplied via a backfeed from the 500 kilovolt (KV) switchyard. At 0151, the 500KV output breakers opened, interrupting the backfeed. Both Emergency Diesel Generators started and energized their respective Engineered Safeguards busses.

During the loss of one (500KV backfeed) of the two available offsite power sources, decay heat removal cooling stopped and was restarted five minutes later when the alternate source of power (230KV) reenergized the safety related busses. During the time decay heat removal was not available the 94 degree Fahrenheit (F) reactor coolant temperature increased a maximum of approximately 14 degrees F near the center of the core, while temperatures near the core barrel increased substantially less. The offsite power from the 230KV switchyard was available during the entire evolution.

Salt water entered switchyard cable trenches as the result of a winter storm. Salt water immersion of a degraded cable is suspected to have contributed to the cable failure, subsequent actuation of relays which opened breakers, and loss of one of two available offsite power sources. The damaged cables were replaced and other cables were tested and replaced as necessary. FPC has approved a project for control and power cable replacement and separation.

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#### EVENT DESCRIPTION

On March 29, 1993, Florida Power Corporation's (FPC) Crystal River Unit 3

(CR-3) was in MODE 5, COLD SHUTDOWN. Reactor Coolant System (RCS) [AB]

temperature was approximately 94 degrees Fahrenheit (F). All electrical

power was being supplied via backfeed from the 500 kilovolt (KV)

switchyard [FK] through the 500KV output breakers [EL, BKR], stepup (Output) transformers [EL, XFMR] and auxiliary transformer [EL, XFMR]. The startup transformer [E, XFMR] was out of service due to maintenance and modification activities. The other offsite power source available at this time was the offsite power transformer [EB, XFMR]. This transformer supplies power from the 230KV switchyard [FK] to the Engineered Safeguards (ES) busses [EB/ED, BU]. The offsite power transformer does not provide power to the non-ES busses [EA/EC, BU].

At 0151, the 500KV output breakers opened resulting in the loss of one of the two available offsite power sources. All ES busses and non-ES busses deenergized. Relays [EB, 27] which monitor ES bus voltages sensed the loss of power and issued a start command to the Emergency Diesel Generators (EDG) [EK, DG]. Both EDGs started and energized their respective ES busses.

When the ES busses deenergized, the operating Decay Heat (DH) removal pump [BP, P] tripped. At 0156, after verifying availability of power and condition of equipment, operators promptly restarted the "B" DH pump and restored DH removal in accordance with plant procedures.

At 0228, operators aligned the "A" ES bus to the 230KV switchyard via the offsite power transformer and began steps to secure the "A" EDG.

Operators then aligned power to the "A" 480V Reactor Auxiliary Bus [EC, BU]. This allowed them to operate 480V equipment not normally powered from the ES busses. At 0258, operators transferred the "B" ES bus to the

offsite power transformer and began steps to secure the "B" EDG.

The event was reported to the Nuclear Regulatory Commission at 0225 on March 29, 1993 via the Emergency Notification System per the requirements of 10 CFR 50.72(b)(2)(ii). This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv).

#### EVENT EVALUATION

All equipment functioned as designed during this event. Both EDGs started and energized their respective ES busses within the required time span.

During the loss of one (500KV backfeed) of the two available offsite power sources, DH removal cooling stopped and was restarted five minutes later when alternate source of power reenergized the safety related busses. During the time DH removal

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was not available, the 94 degrees F RCS temperature, as measured at the core [AC] exit, increased a maximum of approximately 14 degrees F near the center of the core, while temperatures near the core barrel increased substantially less. Maximum temperature reached was 108 degrees F. Adequate subcooling existed at all times.

#### CAUSE

On March 13, 1993, a severe winter storm crossed the Florida coast. The resulting storm surge caused flooding of the 230KV and 500KV switchyards. Salt water from the extreme storm surge filled cable trenches [FK] in the

two switchyards. These trenches contain 480V alternating current and 120V direct current power and control cables [FK, CBL] which feed relays [FK, RLY], breakers [FK, BKR], and other equipment in the switchyards. Salt water immersion of one of the 480V cables, which apparently contained degraded or damaged cable insulation [FK, ISL], is suspected to have contributed to the failure of the cable resulting in arcing which damaged adjacent cables. The resulting electrical transients actuated protective relays [FK, RLY] which caused the 500KV output breakers to open and the subsequent loss of one of the two available offsite power sources.

#### CORRECTIVE ACTION

Corrective actions for this event include the following:

1. The damaged cables were replaced and other cables were tested and replaced as necessary; and
2. An FPC management review team was organized and conducted an investigation of the events related to this severe winter storm.

Following the management team's recommendations, FPC approved a project for switchyard breaker control and power cable replacement for both the 230KV and 500KV switchyards.

The original cable configuration comprised primary and back-up control cables as well as power cables installed in the same trenches. Under the approved project, new cable trenches were constructed which included new primary control and new power cables

separated by a barrier. The originally installed back-up control cables remained in the existing trenches. Completion of this project will be determined by outages enabling work performance. The previously scheduled date for completion of this work was the end of the Refuel 10 Outage.

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Since both the 500KV and 230KV switchyard work requires coordination among all five units on the Crystal River site (CR-3 Nuclear Unit, CR-1,2,4, & 5 Fossil Units), completion of this work is dependent on the status of each unit as well as the requirements of the Energy Control Center (ECC). Completion of this work has been delayed by circumstances beyond the control of CR-3 management (e.g. Unit 2 currently off-line due to a boiler tube rupture).

Approximately six days work is required to complete the 230KV switchyard work. This effort, although unrelated, is expected to be completed prior to the 500KV switchyard work which requires a Unit 5 outage to complete. Unless a forced outage of sufficient duration occurs at Unit 5, the next available opportunity to complete this work may be during a five day inspection in September 1996 and more likely during the outage scheduled for February 1997.

The reliability and testing of both the 230KV and 500KV switchyard components is addressed in the FSAR Sections 8.2.1.2, 8.2.3.3 and 8.3. The availability of the preferred offsite power supply lines,

based upon 230 KV switchyard work remaining, was reviewed against the Enhanced Design Basis Document (EDBD) section 4.1 and the Improved Technical Specifications (ITS) section 3.8.1 to ensure none of the deferred items impact the line(s) reliability or availability. Either 500 KV switchyard line was designed to carry in excess of both CR-3 and CR-5 100 percent output capacity so that routine breaker testing and maintenance could be performed with the generator in service. Since the 500 KV switchyard is not a preferred source of emergency power to CR-3, no loss of safe shutdown power would be caused by the corrective maintenance deferred in the 500 KV switchyard.

#### PREVIOUS SIMILAR EVENTS

This was the first interruption of offsite power that can be attributed to the loss of 500KV backfeed. On four previous occasions, offsite power was interrupted due to loss of power feeds from the 230KV switchyard.

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Florida

Power

CORPORATION

Crystal River Unit 3

Docket No. 50-302

May 10, 1996

3F0596-18

U. S. Nuclear Regulatory Commission

Attention: Document Control Desk

Washington, D. C. 20555

Subject: Licensee Event Report (LER) 93-002-03

Dear Sir:

Please find the enclosed Licensee Event Report (LER) 93-002-03. This supplement is submitted by Florida Power Corporation in accordance with 10 CFR 50.73.

This supplement provides a revised corrective action completion date for work in the 230KV and 500KV switchyards.

Sincerely,

B. J. Hickie, Director

Nuclear Plant Operations

JAF:ff

Attachment

cc: NRR Project Manager

Regional Administrator, Region II

Senior Resident Inspector

CRYSTAL RIVER ENERGY COMPLEX : 15760 W Power Line St o Crystal River,

Florida 34428-6708 o (352) 795-6486

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